An exploration of technology acceptance among nursing faculty teaching online for the first time at the onset of the COVID-19 pandemic

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ARTICLE INFO	ABSTRACT
Keywords: Technology acceptance model Online education COVID-19 pandemic Faculty acceptance	*Background:* The COVID-19 pandemic has brought to the forefront the importance for schools of nursing to use creative and innovative tools that are of high quality and accessible to learners. Faculty who may have been resistant to teaching online prior to the pandemic, no longer had the option to teach face-to-face and were mandated to teach online despite any apprehensions they may have had. *Purpose:* The purpose of this study was to learn more about faculty attitudes and acceptance of teaching online by applying the Technology Acceptance Model to nursing faculty teaching online for the first time during the COVID-19 pandemic. *Methods:* This descriptive-correlational study used an online survey tool to explore factors related to technology acceptance among nursing faculty teaching online for the first time during the COVID-19 pandemic. A sample of 87 full-time and part-time nursing faculty completed an adapted version of the Faculty Acceptance Survey. *Results:* Findings from this study revealed an overall enjoyment of teaching online, confidence in online teaching skills and comfort with technology. However, findings also indicated struggles with workload balance, inferior interactions with students and the need for additional support. *Conclusion:* Findings from this study demonstrate that nursing faculty are generally accepting of technology and positive outcomes are possible if identified concerns are addressed and positive feelings are fostered and supported.

Introduction

The resistance of faculty to online education is well documented (Ahmed & Ward, 2016; Gratz & Looney, 2020; Lloyd, Byrne, & McCoy, 2012; Mitchell, Parlamis, & Claiborne, 2015). Reasons for resistance include factors such as fear of the unknown, a discipline not being suited to online teaching, an absence of time for online course preparation, and a lack of skills or confidence in teaching online, as well as lack of formal training (Gratz & Looney, 2020; Mitchell et al., 2015). The COVID-19 pandemic has brought to the forefront the need for schools of nursing to use creative and innovative teaching tools and strategies that are of high quality and accessible to learners. Faculty who may have been resistant to teaching online prior to the pandemic, no longer had the option to teach face-to-face and were mandated to teach online despite any apprehensions they may have had. In as much as some nursing faculty may prefer face to face teaching/learning situations, the pandemic has spotlighted the significance of online teaching/learning.

According to the Technology Acceptance Model (TAM) (Davis,

1989), there are 2 constructs that can determine faculties' willingness to teach in the online environment. These include perceived usefulness (PU) and the perceived ease of use (PEU) (Davis, 1989). PU corresponds with the belief that technology is needed to effectively carry out or enhance one's job functions. PEU is related to the degree of difficulty one anticipates from learning or using a technological tool. The TAM was later revised to the TAM2, which extended the TAM to include factors that influence PU (Venkatesh & Davis, 2000) such as social influence processes which corresponded with concepts such as subjective norms, voluntariness, and image and cognitive instrumental processes, which corresponded with concepts related to job relevance, output quality, result demonstrability, and perceived ease of use (Venkatesh & Davis, 2000).

While the TAM and the TAM2 have been applied to a variety of areas in higher education, there are few studies that have focused on the TAM as it relates to teaching online in the area of higher education (Alsofyani, Aris, Eynon, & Majid, 2012; Gibson, Harris, & Colaric, 2008; Huang, Deggs, Jabor, & Machtmes, 2011), and even fewer that have explored

the TAM or the TAM2 as it relates to faculty in nursing education (Tacy, 2018). Factors related to technology acceptance among nursing faculty is an important concept to study because online nursing programs continue to increase, and faculty cooperation is essential to the success of these programs (Blundell, Castaneda, & Lee, 2020; Walters, Grover, Turner, & Alexander, 2017). Furthermore, faculty in the area of higher education were compelled to teach online during the COVID-19 pandemic despite any previous resistance they may have had to this modality. These areas of resistance may have impacted their ability to teach online in an effective way or revealed other barriers otherwise unknown. Identifying factors that contribute to technology resistance among nursing faculty teaching online for the first time during the COVID-19 pandemic may identify barriers, resources and needed support related to technology acceptance that may assist nursing faculty in teaching online effectively.

The purpose of this study was to learn more about faculty attitudes and acceptance of teaching online by exploring a variety of concepts related to PU and PEU among nursing faculty teaching online for the first time during the COVID-19 pandemic. This quantitative research extends the Technology Acceptance Model by applying it to nursing faculty in higher education.

Review of literature

According to Wingo, Ivankova, and Moss (2017), higher education faculty in the United States are increasingly being required to teach online however, there is unwillingness among faculty to accept online teaching. Among reasons for resistance were fear of change, concerns about reliability of technology systems, skepticism about students' outcomes and concerns about workload (Wingo et al., 2017). Wingo et al. (2017) highlighted that it is critical for institutions of higher education to foster faculty acceptance of online education methods through the use of training and support.

Chow, Herold, Choo, and Chan (2012) noted that healthcare researchers are noticeably lagging in showing the usefulness of technology acceptance and cited the Technology Acceptance Model (TAM) as being predictive in its ability to bring to light the constructs that have an influence on the intentions of individuals to use technology. The TAM conceptualizes an individual's behavioral intention to use technology systems and is determined by two factors. First is the technology's perceived usefulness (PU), that is, "the extent to which an individual believes the technology system will enhance his/her work performance" (Venkatesh & Davis, 2000, p 187). Second, the perceived ease of use (PEU), that is, the extent to which an individual believes using a technology system will require little to no effort to be used accurately (Venkatesh & Davis, 2000).

TAM focuses mainly on behavioral intention and actual behavior (Chen, Yang, Tang, Haung, & Yu, 2008). Chen et al. (2008) suggest that behavioral intention is the most significant determinant of behavior. The authors further suggest that there are a few studies that have explored nurses' behavioral intentions toward web-based learning but that these studies lack a theoretical framework to explore the determinants of web-based learning. Furthermore, these studies do not address nursing faculty acceptance of technology. Among the few studies to explore technology acceptance among nursing faculty, Tacy (2018), noted that nursing faculty may experience stress when teaching traditional nursing courses in non-traditional ways due to the expectation of teaching, stimulating, and facilitating learning using technology. Tacy (2018) further suggests that it is technology and its integration into teaching that may create stress which may affect nursing faculty attitudes toward the use of technology; consequently, interfering with job performance and satisfaction. Hence it is important to identify stress related to the use of technology systems or technostress and use effective stress reduction techniques to decrease the stress and improve the quality of teaching and learning. (Tacy, 2018).

The TAM and TAM2

The TAM is a model that is used to determine how an individual's beliefs and values may impact their intention to use technology (Davis, 1989). Though originally applied to the area of business, since it's development in 1989, the TAM has been widely used and noted for its applicability to a vast array of disciplines including business, education, and health care (Abdullah & Ward, 2016; Jokar, Noorhosseini, Allahyari, & Damalas, 2017; Pando-Garcia, Perianez-Cañadillas, & Charterina, 2016; Scherer, Siddiq, & Tondeur, 2019). The premise behind the TAM is that attitudes and beliefs predict intention and intention predicts behavior (Cheng, 2019). The origins of the TAM are deeply rooted in the Theory of Reasoned Action (TRA) which holds that an individual's intention toward an action is significantly impacted by their beliefs as well as the consequences of that action (Ajzen & Fishbein, 1980; Teo, 2012).

The TAM was further extended to demonstrate the relationship between specific factors that had the potential to influence technology acceptance, resulting in the development of the TAM2. Researchers found that PEU was significantly affected by computer self-efficacy both before and after use (Davis & Venkatesh, 1996), while PU was significantly affected by social influence processes and cognitive instrumental processes (Venkatesh & Davis, 2000). Social influence processes included factors such as subjective norms, voluntariness, experience and image, whereas cognitive instrumental processes included factors such as job relevance, output quality, result demonstrability, and perceived ease of use (Venkatesh & Davis, 2000).

The TAM2 is a validated framework that has been successfully applied to a variety of disciplines to determine factors related to technology acceptance (Khoa, Ha, Nguyen, & Bich, 2020; Venkatesh & Davis, 2000; Wingo et al., 2017). While this model was developed several years ago, recent studies applying this model to a variety of healthcare and educational contexts, demonstrate that it is still relevant today (Granić & Marangunić, 2019; Rahimi, Nadri, Afshar, & Timpka, 2018; Salloum, Alhamad, Al-Emran, Monem, & Shaalan, 2019). The flexibility of this model is also demonstrated in its applicability to modern constructs such as virtual reality and social network sites (Sagnier, Loup-Escande, Lourdeaux, Thouvenin, & Valléry, 2020; Weerasinghe & Hindagolla, 2018). The TAM2 is particularly suited to an investigation of faculty perceptions related to technology and teaching online as it was developed to explore beliefs related to technology as well as beliefs about how the use of technology might affect an individual's role in their organization (Wingo et al., 2017).

This study will answer the following research questions:

1. What are the beliefs and attitudes of nursing faculty teaching online for the first time during the COVID-19 pandemic related to the perceived ease of online education?
2. What are the beliefs and attitudes of nursing faculty teaching online for the first time during the COVID-19 pandemic related to the perceived usefulness of online education?
3. Do nursing faculty teaching online for the first time during the COVID-19 pandemic nursing faculty prefer teaching online compared to face-to-face teaching

Methods

Study design

This descriptive-correlational study used an online survey tool to explore factors related to technology acceptance among nursing faculty teaching online for the first time during the COVID-19 pandemic. An Institutional Review Board (IRB) exemption was granted by Lehman College, City University of New York (CUNY) prior to the recruitment of participants. Completion of the survey tool implied consent to voluntarily participate in this study.

Sample

All full-time and part-time nursing faculty teaching online for the first time during the the COVID-19 pandemic, which coincided with the Spring 2020 semester, were eligible to participate in this study. I recruited faculty virtually from the Sigma Theta Tau International (SIGMA) Nursing Honor Society Nurse Educator Forum, the American Association of Colleges of Nursing CONNECT Forum and several Facebook groups with a focus on Nursing Education. Faculty who did not meet the inclusion criteria were excluded from the study.

A power analysis using a population size of 10,568 full-time nurse educators as reported by the National League for Nursing (National League for Nursing, 2020). Although, part-time educators were invited to participate, a population size for both full-time and part-time educators was not available. A confidence interval of 95% and a margin of error of 10% yielded a proposed sample size of 96 participants. Based on a literature review of previous studies related to the TAM and college educators, I sought a goal of 100 participants for this study (Alsofyani et al., 2012; Gibson et al., 2008; Huang et al., 2011). Participants were recruited between February 2021 and March 2021.

Instrument

The TAM2 scales of perceived usefulness, perceived ease of use, and behavioral intention were measured using items adapted from a 44-item survey exploring the predictive power of the TAM2 in relation to faculty intent to teach online called the Faculty Acceptance Survey (Stewart, Bachman, & Johnson, 2010). In addition to demographics, the survey measured the TAM2 constructs including PU and PEU as well as additional variables related to online teaching acceptance. Survey categories included Computer Use, Ease of Use, Perceived Usefulness, Faculty Motivations for Online and Traditional Instruction, Faculty Acceptance, Faculty Intent, and Faculty Support & Development Opportunities.

The survey tool was originally piloted with a group of six college-level administrators and 121 faculty members employed at a large, public, open-enrollment University and demonstrated a high measure of consistency with a Cronbach alpha of 0.63 (PEU), 0.95 (PU) and 0.82 (Facilitating Conditions) (Stewart et al., 2010). Results from that study demonstrated that the TAM2 was an effective framework to determine faculty intent to teach online and related beliefs about teaching online and faculty acceptance. The survey was revised in this study so that it applied to various Learning Management Systems (LMS) and faculty from different Colleges/Universities with a focus on faculty motivations for teaching online. Content validity for revised tool was determined by 2 nursing faculty research experts. The adapted survey was pilot tested with a group of 28 participants at a single site with faculty from a variety of disciplines prior to use in this study. Minor changes were made to make the survey more applicable to multi-site faculty from a single discipline, such as including questions about college/university demographics and learning management systems. In addition to demographic questions, the tool included Likert-style questions that included a variety of scales with possible response ranges such as "Not Comfortable" to "Very Comfortable", "Not Useful" to "Very Useful", "Not Easy" to "Very Easy", and "Strongly Disagree" to "Strongly Agree". The revised tool demonstrated good internal consistency with a Cronbach Alpha of 0.937. The survey was distributed through LimeSurvey, a versatile online survey tool.

Data collection

An invitation to participate in this study was posted to various nurse educator forums including Sigma Theta Tau International (SIGMA) Nursing Honor Society Nurse Educator Forum, the American Association of Colleges of Nursing CONNECT Forum and several Facebook groups with a focus on Nursing Education. An invitation explaining the purpose of the study, eligibility requirements and a link to the survey was posted

on each platform twice a month (every 2 weeks) in February 2021 and March 2021.

Data analysis

Frequency distributions were evaluated for the PEU and PU variables. Frequency tables and bar plots were used to interpret data results. Percentage values for selected variables are reported below. Correlational analyses for determining the relationship between select variables and preference for teaching online were determined through a one-sided *t*-test.

Results

One hundred and twenty-six participants responded to the survey invitation. Of those, 6 respondents who taught online prior to Spring 2021 were removed. In the end, 120 responses were used in the final analysis. Demographic data for the study participants are listed in Table 1.

Perceived Ease of Use (PEU)

Three items assessed PEU using a four-point response scale ranging from 1 (not at all easy to use) to 4 (very easy to use). For these items, many participants found it somewhat easy to find educational resources online (39%), become more skillful in using educational technology (45%) and use their Learning Management System (LMS) (42%).

Table 1
Survey respondent demographics (n = 87).

Variables	N (%)
Age	
20–30 years old	1
31–40 years old	20
41–50 years old	29
51–60 years old	37
61 or older	21
No response	12
Gender	
Female	105
Male	3
Other	12
Level of students taught	
Undergraduate	90
Graduate	6
Both	8
Other	9
No response	7
College/university status	
Private	38
Public	67
Other	3
No response	12
Job title	
Lecturer (adjunct or full time)	19
Assistant professor (adjunct or full time)	29
Associate professor (adjunct or full time)	16
Professor (adjunct or full time)	22
Department chair	4
Dean	1
Other	16
No response	13

The relationship between age and PEU and PU variables were evaluated. Participants in the 20–40 year age range were statistically significantly more comfortable with using internet based social networking programs than older age groups ($p < 0.001$). Participants in lower age groups (<40 years) were statistically significantly more likely to agree that teaching online allowed them more time to dedicate to home responsibilities ($p < 0.05$). There were no other statistically significant differences between age and PEU and PU variables.

Perceived Usefulness (PU)

PU is comprised of a variety of factors including subjective norms, voluntariness, experience, image, job relevance, out-put quality and result demonstrability (Davis, 1989).

Subjective norms

Subjective norms refer to the extent to which an individual believes that others in the organization find value in technology (Venkatesh & Davis, 2000). This concept was captured under the category *Faculty Support & Development Opportunities* as this section focused on the value that the institution placed on preparing educators to teach online.

Voluntariness

In this study, online teaching was compulsory due to the COVID-19 pandemic, therefore voluntariness was not assessed.

Experience

Even though all participants were teaching fully online for the first time during the Spring 2021 academic semester, most of them (73%) had some experience with their Learning Management System prior to Spring 2020. The vast majority of participants felt comfortable using a computer (80%) and search engines such as Google (85%). Most participants also rated using a variety of software tools very often, such as Microsoft Word (89%), Microsoft PowerPoint (74%), the internet (97%) and email (97%).

Image

A large percentage (83%) of participants felt that it was important for online degree programs at their College/University to be recognized as being of high-quality. However, most participants (74%) also felt that an online degree was *not* as prestigious as a degree earned by taking face-to-face classes.

Job relevance

Many participants felt that students who completed online degrees would have the same opportunities in the workforce as students who completed face-to-face degrees (62%) and to attend graduate school (76%). Almost all participants felt that it was important for students completing online degrees to have the same learning opportunities as face-to-face graduates (96%) and the same post-graduate opportunities as face-to-face graduates in terms of hiring opportunities and attending graduate school (93%).

Output quality

Almost all participants (99%) found educational technology such as their LMS and tools such as YouTube to be useful for content delivery. Almost all participants also found the tools in their Learning Management System (LMS) to be useful in helping to meet their learning objectives. Among the most useful tools were the features that allowed them to share their course Syllabus (94%), weblinks/media files (94%) assignments (95%), the Announcements feature (95%), send emails (91%) and the Grade Center (91%).

While many participants (74%) felt that teaching online would make their teaching *less effective* than teaching face-to-face, 95% felt that online education was at least somewhat effective for student learning.

Result demonstrability

Most participants felt that teaching online left them with *less* time to dedicate to other teaching responsibilities (61%), research responsibilities (58%) and service responsibilities (55%). However, 49% of participants felt that teaching online allowed them more time to dedicate to home responsibilities compared to 46% that disagreed.

Faculty motivations for online and traditional instruction

Commuting related issues such as wear and tear on car, gas, and mileage was *not* a significant motivating factor for teaching online as only 50% of participants agreed with this statement and the other 50% either disagreed or neither agreed nor disagreed. Courses being scheduled at inconvenient locations also did not play a significant motivating factor with only 42% of participants agreeing with this statement.

More participants were motivated to teach online because they enjoyed teaching online (45%), than those who did not have this motivation (22%) and 48% felt confident in their online teaching skills as opposed to 18% who were not motivated by confidence. Only 12% of participants were motivated to teach online by a belief that students would learn more in online classes than in hybrid or face-to-face classes and only 3% were motivated to teach online because of the financial incentives provided for online teaching. Additionally, only 21% felt fearful of teaching online and 28% felt excited. An additional 51% felt neither fearful, nor excited.

In regard to teaching face-to-face, 92% of participants agreed that they enjoyed teaching face-to-face and 86% preferred it over teaching online due to the ability to interact with students. Most participants also felt that students desire (72%) and learn more in (61%) face-to-face classes versus online classes. However, there was no significant difference between those who felt that teaching online was frustrating and cumbersome (41% agree, 45% disagree, 14% neither agree nor disagree). Only 25% of participants felt that their student evaluations would suffer due to teaching online, but many participants felt that it was more difficult to communicate with (56%) and assess students effectively (62%) online. Most participants also felt they were more responsive to students in face-to-face classes (57%) and more motivated while teaching face-to-face classes (60%). A majority of participants did not mind commuting to school (62%) and felt they were scheduled to teach at convenient times (56%) and locations (61%). In addition, many participants found face-to-face classes easier to teach than online classes (66%) and felt that online teaching required more effort than face-to-face teaching (76%).

Faculty acceptance

Most participants (76%) felt that students who completed online degrees would have the same opportunities to attend graduate school as students who completed face-to-face degrees, and 53% felt that students who complete online degrees would have the same opportunities in the workforce as students who complete face-to-face degrees. However, only 12% agreed that an online degree was as prestigious as a degree earned by taking face-to-face classes.

Faculty intent to teach online

A majority of participants expressed interest in teaching online (63%) and receiving additional training (68%). Most participants were also interested in receiving training from a certification program (66%) and having their online courses evaluated by peers (60%).

Faculty support & development opportunities

In terms of support and development opportunities, almost all participants (85%) found support services such as 24/7 LMS support and tutorials as important. Most participants also found additional services as important such as e-library resources (86%), library tutorials (78%), a virtual writing center (76%), a virtual advising center (79%), a virtual student services center (82%), and a virtual student with disabilities center (94%). Almost all participants (98%) also agreed that it was important for faculty to be trained in how to offer good online courses and that online degree programs at their College/University were recognized as being of high-quality (83%). Participants also felt that it was important for students completing online degrees to have the same learning (96%) and post-graduate (93%) opportunities as face-to-face graduates in terms of hiring opportunities and attending graduate school.

Preference for teaching online

To test whether nursing faculty preferred online teaching compared to face-to-face teaching, attention was restricted to those who expressed some level of agreement or disagreement with select variables. Participants scoring in the neutral category (4 = 'Neither agree nor disagree') were excluded from the analysis as well as those with missing data. We performed a one-sided *t*-test evaluating the following hypothesis:

- H0: probability that online is preferred is ≤0.5
- H1: probability that online is preferred is >0.5

Small *p*-values ($p < 0.05$) led to rejection of the null hypothesis. *p*-Values less than 0.05 indicated a statistically significant preference for online teaching among those who were not neutral. Table 2 represents the variables with statistically significant results indicating a preference for online teaching among those not neutral.

Discussion

There is a lack of research that addresses nursing faculty's use of technology. The application of the TAM2 to nursing education provides an opportunity to expand teaching and learning capacity. As such, it is important to understand factors that contribute to nursing faculty acceptance of technology and online education. This study has identified several important findings among nursing faculty teaching online for the first time during the COVID-19 pandemic such as an overall enjoyment of teaching online, confidence in online teaching skills and comfort with technology such as Learning Management Systems (LMS). The following discussion will explore highlighted findings as they relate to the TAM2 scales.

Perceived Ease of Use (PEU)

One of the few studies conducted with nursing faculty related to technology acceptance found that educators perceived stress when they were unable to adapt to and use technology in a healthy manner (Tacy, 2018). Other studies among college educators found that stress related to PEU was typically due to technological barriers as well as the time it took to learn and use new technology (Bolliger & Wasilik, 2009; DeGagne & Walters, 2010; Green, Alejandro, & Brown, 2009). In addition to this, previous studies have identified computer self-efficacy and faculties' beliefs about their own computer skills and competence as a barrier to satisfaction with teaching online (Zhen, Garthwait, & Pratt, 2008). However, this current study found that nursing faculty were confident in their ability to use computers and were comfortable using technology and managing their learning management systems (LMS). In fact, all participants felt either somewhat comfortable, comfortable or very comfortable using a desktop or laptop computer and using internet-based search engines. Ninety-eight percent of respondents reported feeling some level of comfort using their LMS to teach online and 90% of respondents found some level of ease in finding online educational resources to assist with teaching.

Table 2
Preference for teaching online.

Survey item	Prefer online	*p* value
I am motivated to teach online because of commuting related issues	59%	0.050
I enjoy teaching online classes	67.5%	0.001
I am motivated to teach online because I am comfortable with my Learning Management System	75%	<0.001
I am motivated to teach online because I am confident in my online teaching abilities	72.3%	<0.001

Perceived Usefulness (PU)

Perceived usefulness is defined as the degree to which a person believes that using a particular technology will enhance his or her job performance (Davis, 1989). PU is comprised of a variety of factors including subjective norms, voluntariness, experience, image, job relevance, out-put quality and result demonstrability. In regard to PU, 90% of participants felt that educational technology was useful for content delivery, however, 74% felt that teaching online was less effective for them than teaching face-to-face. Additional variables related to PU are further discussed in the following sections.

Preference for teaching online

This study found that a statistically significantly greater percentage of nursing faculty enjoyed teaching online ($p < 0.05$). In addition, a statistically significant percentage of participants felt confident in their online teaching abilities ($p < 0.001$). These are important findings to note, as previous research has shown that faculty who were more confident about their technical skills were more willing to teach online (DeGagne & Walters, 2010; Green et al., 2009).

Some of the variables that did not support a preference for teaching online were those related to workload. Regarding these variables, approximately 60% of respondents felt that teaching online allowed less time to dedicate to other teaching responsibilities, research, and service responsibilities. This finding is consistent with previous studies indicating that many faculty members felt teaching online required more time and effort than face-to-face teaching (Bacow, Bowen, Guthrie, Lack, & Long, 2012; DeGagne & Walters, 2010; Huang et al., 2011; Lloyd et al., 2012; Mason et al., 2010). In the TAM2, these variables related to the construct *Result Demonstrability*. Result demonstrability relates to the perceived tangible results or benefits that a technology offers (Venkatesh & Davis, 2000). Previous studies also identified dissatisfaction with other tangible benefits such as compensation where many faculty members felt they were not adequately compensated when teaching online (Bacow et al., 2012; DeGagne & Walters, 2010; Huang et al., 2011; Lloyd et al., 2012; Mason et al., 2010). This current study also found that nursing faculty did not feel there was adequate financial incentive for teaching online.

In addition to time and workload, another variable related to the PU construct of *Result Demonstrability* was time with students. Nursing faculty felt that they were less interactive with and less responsive to students in online courses as opposed to those in face-to-face courses. This is a finding that has been reported in multiple studies by students enrolled in fully online courses (Murphy & Stewart, 2017; Sorensen & Donovan, 2017). In general nursing faculty felt it was easier to assess, teach and grade students in face-to-face classes as opposed to online courses.

Another variable related to the construct *Result Demonstrability* that did not support a preference for teaching online was related to student evaluations. While only 25% of participants felt their student evaluations would suffer as a result of teaching online, only 25% felt their evaluations would improve. This finding was contradictory to other reported findings in this study that reported a high confidence in online teaching abilities; however, this is not a new discovery as previous research has shown that concerns about tenure, promotion and poor student evaluations were a concern among faculty teaching online in the area of higher education (Gaytan, 2009; Green et al., 2009; Mason et al., 2010; Orr, Williams, & Pennington, 2009).

Participants in this study did not believe that students desired online courses more than face-to-face courses or that students learned more in online courses. These variables related to the PU construct *Output Quality* in the TAM2, which is concerned with how effective technology is in accomplishing specific tasks (Venkatesh & Davis, 2000). Previous studies in the area of higher education have connected this construct to the effectiveness and usability of the institutional Learning Management

System (LMS), educational technology tools and students' ability to navigate technologies successfully (Bolliger & Wasilik, 2009; Green et al., 2009; Ward, Peters, & Shelley, 2010). This raises the question of whether students are provided with training related to taking online course or are adequately prepared to be successful in online classes.

An area of need that was revealed in this study was the need and desire for faculty support and development opportunities. In the TAM2, these variables fall under the PU construct, *Subjective Norms*. Subjective norms refer to the extent to which an individual believes that others in the organization find value in technology (Venkatesh & Davis, 2000). Previous studies revealed that positive communications from administrators about the reasons for teaching online and institutional goals and policies that aligned with online education were supportive of positive subjective norms (Betts & Heaston, 2014; Huang et al., 2011; Maguire, 2009; Orr et al., 2009; Wang & Wang, 2009; Wickersham & McElhany, 2010). An additional factor that was associated with subjective norms was institutional support such as instructional design support and access to proctoring software (Chapman, 2011; Wickersham & McElhany, 2010). This finding was supported in this current study where an average of 96% of participants reported faculty support and development opportunities as important.

In terms of the PU construct *Image*, most participants felt that an online degree was *not* as prestigious as a degree earned by taking face-to-face classes. This finding is supported by previous findings that suggested faculty believed that online degrees and student outcomes were inferior to those of face-to-face degrees and programs (Allen & Seaman, 2012; Allen & Seaman, 2015; Bacow et al., 2012; McQuiggan, 2012).

Implications for nursing education

This study highlights the need for education and training in developing innovative ways to engage students in online courses. This study also suggests that support is needed for students taking online courses to help them be successful. Additionally, academic leaders such as Deans and Chairs should be aware of the impact that factors such as workload and course evaluations may have on faculty that are either new to or struggling with teaching online. These factors may also have a significant impact on tenure and promotion results. As a result, administrators might consider offering release time or reduced workloads to offset this barrier (Lloyd et al., 2012).

Future research

There is an opportunity for further research into the impact that factors related to workload, student evaluations have on the attainment of tenure and promotions for faculty teaching primarily online. Additionally, there is a need to explore beliefs about the prestige of online degrees and courses as this was identified as an area of concern among faculty.

While the purpose of this study was to learn more about nursing faculty attitudes and acceptance related to teaching online, further studies might explore the relationship between various demographic variables such as age on attitudes related to teaching online as well as the availability of supportive resources at private vs. public schools.

Limitations

One significant limitation of this study was in exploring of the TAM2 construct *Voluntariness*. Nursing faculty members who were teaching online during the COVID pandemic were compelled to teach online after physical campuses closed to minimize exposure and spread of the virus. In addition, faculty were given a very short period of time to adapt their courses to the online environment. This type of introductory experience to faculty new to this mode of teaching can be slightly traumatic and induce negative feelings due to barriers and circumstances that were out of the control of themselves and administrators. These feelings may have slightly biased responses. Also, the availability of resources for transitioning online may vary from institution to institution, which was not a concept explored in this study.

An additional limitation of this study was the self-selection process of participants. It is possible that participants who felt very positive about their online experience may have chosen to participate whereas those who felt less confident and successful in their first endeavor teaching online may have elected not to participate.

Conclusion

In order for online programs to be successful, faculty must be supportive and "buy-in" to the ideas and vision shared by academic leadership programs (Blundell et al., 2020; Walters et al., 2017). As online programs in the area of nursing education continue to increase, it is important to understand barriers identified by faculty who may have previously been resistant to teaching online. This study revealed encouraging data about the relatively high confidence and comfort that nursing faculty have with teaching online and overall positive attitudes about teaching online. Areas of concern that were revealed were those around concerns of workload balance, inferior interactions with students and the need for additional support. Overall, these findings demonstrate that nursing faculty are generally accepting of technology and positive outcomes are possible if identified concerns are addressed and positive feelings are fostered and supported.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Faculty acceptance of online teaching — adapted for nursing faculty

Computer use
Please rate your comfort with the following tasks using the scale below:

1. Not comfortable
2. Somewhat comfortable
3. Comfortable
4. Very comfortable
5. Not applicable

How comfortable do you feel with using a desktop or laptop computer?	1	2	3	4	5
How comfortable do you feel with using internet-based search engines such as Google, Bing, and Yahoo?	1	2	3	4	5

(*continued*)

Computer use					

Please rate your comfort with the following tasks using the scale below:

1. Not comfortable
2. Somewhat comfortable
3. Comfortable
4. Very comfortable
5. Not applicable

How comfortable do you feel with using internet based social networking programs such as My Space, Face book, Twitter, etc.?	1	2	3	4	5
How comfortable do you feel using the Learning Management System (Blackboard, Canvas, D2L, etc.) features required to teach your course successfully?	1	2	3	4	5

Please rate how often you use the following programs/tools/software on the computer:

1. Never
2. Occasionally
3. Often
4. Very often

Word processing program such as Word	1	2	3	4
Spreadsheet program such as Excel	1	2	3	4
Presentation program such as Power Point	1	2	3	4
Calendar program such as Outlook	1	2	3	4
Email	1	2	3	4
Internet	1	2	3	4

Previous LMS use		
Have you used your LMS before the Spring 2020 semester?	Yes	No

Please rate how useful the following tools in your LMS were in meeting your learning objectives:

1. Not useful
2. Somewhat useful
3. Useful
4. Very useful
5. Not applicable

Announcements	1	2	3	4	5
Assessments/tests/quizzes	1	2	3	4	5
Assignments/papers	1	2	3	4	5
Discussion board	1	2	3	4	5
Web-conferencing tool	1	2	3	4	5
Learning modules	1	2	3	4	5
Mailbox or email	1	2	3	4	5
Web-links/media files	1	2	3	4	5
Syllabus	1	2	3	4	5
Grade center	1	2	3	4	5

Ease of use				

Please use the following scale to indicate how easy the indicated tasks are:

1. Not easy at all
2. Somewhat easy
3. Easy
4. Very easy

How easy is it to find online educational resources? (Resources to help you in your teaching; videos, articles, etc.)	1	2	3	4
How easy is it to become more skillful in using online educational technology (Learning Management System, Voice Thread, YouTube, etc.)	1	2	3	4
How easy is it to get your LMS to do what you want it to do?	1	2	3	4

Perceived usefulness				

Please use the following scale to indicate how useful the indicated tasks are:

1. Not useful
2. Somewhat useful
3. Useful
4. Very useful

(*continued*)

Perceived usefulness						

Please use the following scale to indicate how useful the indicated tasks are:

1. Not useful
2. Somewhat useful
3. Useful
4. Very useful

	1	2	3	4
How useful is educational technology (LMS, Voice Thread, YouTube, etc.) for content delivery? (Delivering content to help students meet course objective)	1	2	3	4

Choose one of the following answers

1. Not at all
2. Less effective than face-to-face
3. More effective than face-to-face

	1	2	3
How will teaching online impact your teaching effectiveness?	1	2	3

Choose one of the following answers

1. Not effective
2. Somewhat effective
3. Effective
4. Very effective

	1	2	3	4
How effective is online education for student learning?	1	2	3	4

Faculty motivations for online and traditional instruction							

Use the following scale to indicate to what extent you agree with the following reasons for teaching online courses

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

	1	2	3	4	5	6	7
Teaching online allows me more time to dedicate to other teaching responsibilities	1	2	3	4	5	6	7
Teaching online allows me more time to dedicate to research responsibilities	1	2	3	4	5	6	7
Teaching online allows me more time to dedicate to service responsibilities	1	2	3	4	5	6	7
Teaching online allows me more time to dedicate to home responsibilities	1	2	3	4	5	6	7
I am motivated to teach online because my courses are scheduled at inconvenient locations	1	2	3	4	5	6	7
I am motivated to teach online because of commuting related issues such as wear and tear on car, gas, and mileage	1	2	3	4	5	6	7
I enjoy teaching online classes	1	2	3	4	5	6	7
I am motivated to teach online because I am comfortable with Learning Management System	1	2	3	4	5	6	7
I am motivated to teach online because I am confident in my online teaching abilities	1	2	3	4	5	6	7
I am motivated to teach online because my student evaluations will improve	1	2	3	4	5	6	7
I am motivated to teach online because students desire online courses	1	2	3	4	5	6	7
I am motivated to teach online because my students learn more in online classes than in hybrid or face-to-face classes	1	2	3	4	5	6	7
I am motivated to teach online because I am more responsive to my students in online classes	1	2	3	4	5	6	7
I am more motivated while teaching online classes	1	2	3	4	5	6	7
I am motivated to teach online because I prefer online interaction with students	1	2	3	4	5	6	7
I am motivated to teach online because I prefer online grading	1	2	3	4	5	6	7
I am motivated to teach online because of the financial incentive provided for online teaching	1	2	3	4	5	6	7
I am motivated to teach online because I find online classes easier to teach than traditional classes	1	2	3	4	5	6	7

Choose one of the following answers

1. Excitement
2. Fear
3. Other

	1	2	3
Does teaching online fill you with excitement or fear?	1	2	3

Use the following scale to indicate to what extent you agree with the following reasons for teaching face-to-face courses:

1. Strongly disagree
2. Disagree
3. Somewhat disagree

(*continued*)

Use the following scale to indicate to what extent you agree with the following reasons for teaching face-to-face courses:

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

My schedule is flexible							
1	2	3	4	5	6	7	
I do not mind commuting to school	1	2	3	4	5	6	7
I am scheduled to teach at times that are convenient for me	1	2	3	4	5	6	7
I am scheduled to teach at locations that are convenient for me	1	2	3	4	5	6	7
I enjoy face-to-face classes	1	2	3	4	5	6	7
Not comfortable with my learning Management System	1	2	3	4	5	6	7
Not confident with my online teaching skills	1	2	3	4	5	6	7
Student evaluations will suffer if I teach online	1	2	3	4	5	6	7
Students desire traditional courses	1	2	3	4	5	6	7
I prefer face-to-face classes because of the interaction with students	1	2	3	4	5	6	7
Students learn more in face-to-face classes	1	2	3	4	5	6	7
I am more responsive to students in face-to-face classes	1	2	3	4	5	6	7
I am more motivated while teaching face-to-face classes	1	2	3	4	5	6	7
I find face-to-face classes easier to teach than online classes	1	2	3	4	5	6	7
Online teaching requires more effort than face-to-face	1	2	3	4	5	6	7
It is difficult to assess students learning with online education	1	2	3	4	5	6	7
Teaching online is frustrating and cumbersome	1	2	3	4	5	6	7
It is difficult to communicate with students effectively online	1	2	3	4	5	6	7
Face-to-face teaching allows more opportunity to interact with students	1	2	3	4	5	6	7
It is easier to assess students learning in face-to-face teaching	1	2	3	4	5	6	7
Teaching online requires faculty to be versed in computer skills	1	2	3	4	5	6	7

Faculty acceptance of online teaching

Choose one of the following answers:

1. Yes
2. Uncertain
3. No

Do you think that an online degree is as prestigious as a degree earned by taking face-to-face classes?	1	2	3
Do you think that students who complete online degrees will have the same opportunities in the workforce as students who complete face-to-face degrees?			
Do you think that students who complete online degrees will have the same opportunities to attend graduate school as students who complete face-to-face degrees?			

Faculty intent to teach online

Choose which response best indicates your Intent to Teach Online

1. Not interested
2. Somewhat interested
3. Interested
4. Very interested

How interested are you in teaching online courses?	1	2	3	4
How interested are you in your discipline offering an online degree completion program?	1	2	3	4
How interested are you receiving additional training at my College/University to teach online?	1	2	3	4
How interested are you in receiving additional training from certification programs to teach online?	1	2	3	4
How interested are you in having your online courses peer evaluated? How interested are you in having your online courses peer evaluated?	1	2	3	4

Support and development opportunities

Use the following scale to indicate how important the following are to you:

1. Not important
2. Somewhat important
3. Not sure
4. Important

(continued)

Support and development opportunities					
Use the following scale to indicate how important the following are to you:					
1. Not important					
2. Somewhat important					
3. Not sure					
4. Important					
5. Very important					
5. Very important					
24/7 Learning Management System support					
1		2	3	4	5
Learning Management System tutorials	1	2	3	4	5
E-Library resources	1	2	3	4	5
E-Library tutorials	1	2	3	4	5
Virtual Writing Center	1	2	3	4	5
Virtual Advising Center	1	2	3	4	5
Virtual Student Services Center	1	2	3	4	5
Virtual Students with Disabilities Center	1	2	3	4	5
Faculty are trained in how to offer good online courses	1	2	3	4	5
That the College/University online degree programs were recognized as being of high-quality	1	2	3	4	5
That students completing online degrees had the same learning opportunities as face-to-face graduates	1	2	3	4	5
That students completing online degrees had the same post-graduate opportunities as face-to-face graduates in terms of hiring opportunities and attending graduate school	1	2	3	4	5

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